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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte RICHARD PHILLIPS and IRA L. FRIEDMAN

Appeal 2008-2792
Application 10/724,248
Technology Center 1700

Decided: September 25, 2008

Before CHUNG K. PAK, ROMULO H. DELMENDO, and
JEFFREY T. SMITH, *Administrative Patent Judges*.

SMITH, *Administrative Patent Judge*.

DECISION ON APPEAL

This is a decision on an appeal under 35 U.S.C. § 134 from the Primary Examiner's final rejection of claims 1-10. Claims 11-24 have been withdrawn from consideration. [1] We have jurisdiction pursuant to 35 U.S.C. § 6.

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[1] In rendering this decision we have considered the Appellants' arguments presented in the Brief dated March, 21, 2007.

Appellants' invention is directed to a process for the compaction and sintering of powder metal to obtain a compressed and sintered product having a density of 99+% of theoretical density. The process comprises mixing particles of a metal powder with a lubricant and at least one liquid phase former to form a mixture; compressing the mixture to uniformly distribute the lubricant within the compressed mixture and uniformly distributing the liquid phase former on the particles of metal powder; subsequently sintering the compressed mixture. Claim 1 is representative of the invention and is reproduced below:

> 1. A process comprising the steps of
>
> mixing particles of a metal powder with a lubricant having a characteristic of becoming liquid under pressure and of evaporating under a sintering temperature and at least one liquid phase former to form a mixture;
>
> compressing the mixture at a pressure sufficient to liquefy and uniformly distribute the lubricant within the compressed mixture with said lubricant effecting a uniform distribution of said liquid phase former on said particles of metal powder; and
>
> sintering the compressed mixture at a sintering temperature sufficient to evaporate and drive off said lubricant and to effect a liquid phase sintering of said liquid phase former with said particles of metal powder to obtain a compressed and sintered product having a density of 99+% of theoretical density.

ISSUES ON APPEAL

Claims 1-10 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Allroth, US patent 6,537,489 B2 issued March 25, 2003, and Ozaki, US patent 6,235,076 B1 issued May 22, 2001.

The Examiner (Ans. 3) contends that Allroth discloses a process comprising mixing particles of a metal powder with a lubricant and graphite corresponding to the claimed liquid phase former to form a mixture; compressing the mixture; sintering the compressed mixture at a temperature of 2552 ^{o}F. The Examiner contends that Ozaki teaches lauric acid is a lubricant for iron based metal powders. (Ans. 3). The Examiner concludes that it would have been obvious to a person of ordinary skill in the art to utilize lauric acid as a lubricant in the process of Allroth. (Ans. 3).

Appellants contend that Allroth, taken alone or in combination with Ozaki, does not teach the claimed process step, of "'compressing the mixture at a pressure sufficient to liquefy and uniformly distribute the lubricant within the compressed mixture with [the] lubricant effecting a uniform distribution of said liquid phase former on said particles of metal powder'" (App. Br. 8). In this regard, Appellants argue that Allroth does not teach employing graphite as a liquid phase former (App. Br. 5). Appellants also contend that Allroth taken alone or in combination with Ozaki, does not teach the process step of liquid phase sintering the compressed mixture to obtain a compressed and sintered product having a density of 99+% of theoretical density (App. Br. 9). Appellants also contend that Allroth does not teach the compaction pressures of claims 5 and 7. (App. Br. 10).

The issue presented is: did Appellants identify reversible error in the Examiner's rejection of claim 1-10 under § 103? We answer this question in the negative. The issue turns on whether Allroth taken alone or in combination with Ozakl, discloses compressing the mixture at a pressure sufficient to liquefy and uniformly distribute the lubricant within the compressed mixture and liquid phase sintering the compressed mixture to obtain a compressed and sintered product having a density of 99+% of theoretical density.

We have thoroughly reviewed each of Appellants' arguments for patentability. However, we are in complete agreement with the Examiner that the claimed subject matter is unpatentable within the meaning of § 103 in view of the applied prior art. Accordingly, we AFFIRM the Examiner's rejections.

OPINION

We determine the following Findings of Fact (FF) from the record presented in this appeal:

(1) A known technique of producing a powder metal part involves the steps of mixing a powder metal mass with graphite and a lubricant to form a generally homogeneous mixture and of thereafter pressing and sintering the mixture into a sintered product using a single press and sinter process. This technique results in an intermediate to "high dense" product in the upper end of the 80 to 95% of theoretical density range. (Spec. 2).

(2) Graphite, nickel, phosphorous, and compounds of phosphorous are exemplary liquid phase formers that have a characteristic of forming a liquid phase during sintering and of becoming part of the final product after sintering. (Spec. 3).

(3) A known lubricant for the process of producing a powder metal part with graphite is PSI000 b lubricant supplied by APEX Advanced Materials, LLC, of Cleveland, Ohio. (Spec. 2).

(4) Lauric acid is a lubricant that has a characteristic of transforming from a solid to a viscous liquid at low pressure and temperature and functions, in accordance with the invention, to distribute the liquid phase former over the particles of the metal powder. (Spec. paragraph bridging pp. 2-3).

(5) Sintering of the compressed mixture, i.e., green compact, occurs at a sintering temperature sufficient to evaporate and drive off the lubricant and to effect a liquid phase sintering of the liquid phase former with the particles of the metal powder to obtain a compressed and sintered product having a density of 99+% of theoretical density. (Spec. 3).

(6) Suitable sintering conditions include a temperature in the range of from 2070 ^{o}F to 2500 ^{o}F, in hydrogen and hydrogen based atmospheres, or nitrogen in an all

graphite furnace or vacuum with a preferred temperature of from 2300 °F to 2500 °F from 10 to 60 minutes at temperature to permit the metallic particles to density to 99+% of theoretical density in the final product. (Spec. 4-5).

(7) Suitable compacting conditions, sufficient to liquefy and uniformly distribute the lubricant within the compressed mixture, include a pressure in the range of from 30 to 70 tons per square inch or through use of high velocity compaction in a uniaxial or high compaction press. (Spec 3-4).

(8) Allroth discloses a mixing, compaction and sintering process for metal powder that produces products having density above 99% of the theoretical (pore-free) density. (Allroth 3, ll. 18-26; 4, ll. 36-39).

(9) Allroth discloses mixing particles of a metal powder with a lubricant and at least one liquid phase former (graphite) to form a mixture prior to compaction. (Allroth 2, l. 60; 3, l. 5).

(10) Allroth discloses the mixture is compacting utilizing computer controlled HVC [high velocity compaction] to obtain product having high density. (Allroth 3, ll. 18-26).

(11) Allroth discloses the sintering of the compacted mixture occurs at a temperature of 1400°C (2552 °F). (Allroth, 4, ll. 57-60).

(12) Allroth exemplifies the sintering of the compacted mixture for 30 minutes. (Allroth, 7, ll. 16-17).

A claimed invention is unpatentable if the differences between it and the prior art are "such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art." 35 U.S.C. § 103(a) (2000); *KSR Int'l Co. v. Teleflex, Inc.*, 127 S. Ct. 1727, 1734 (2007); *Graham v. John Deere Co.*, 383 U.S. 1, 13-14 (1966). Under 35 U.S.C. § 103, the factual inquiry into obviousness requires a determination of: (1) the scope and content of the prior art; (2) the differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) secondary considerations such as evidence of unexpected results. *See Graham v. John Deere Co.,* 383 U.S. at 17-18.

The mere recitation of a property or characteristic not disclosed by the prior art does not necessarily confer patentability to a composition or a method of using that composition. *See In re Skoner,* 517 F.2d 947, 950 (CCPA 1975).

Where the prior art establishes a reasonable belief that the property or characteristic recited in the claims would have been inherent to the product or process, the burden of proof shifts to Appellants to show that this characteristic or property is not possessed by the prior art. *See In re Best*,

562 F.2d 1252, 1255 (CCPA 1977); *In re Spada*, 911 F.2d 705, 708 (Fed. Cir. 1990).

Applying the preceding legal principles to the Factual Findings (FF) in the record of this appeal, we determine that the Examiner has established a prima facie case of obviousness.[2] As shown by FF (8-12) above, Allroth discloses a mixing, compacting and sintering process for metal powder, including graphite, that produces products having density above 99% of the theoretical (pore-free) density.[3] The present record (FF 1) discloses a known technique for producing a powder metal part involves the steps of mixing a powder metal mass with graphite and a lubricant thereafter pressing and sintering the mixture into a sintered product having 80 to 95 % of theoretical density. Allroth also discloses that the sintering of the compacted mixture occurs at a temperature of 1400°C (2552 °F) corresponding to the claimed liquid phase sintering condition (FF 11). Although Allroth does not specifically mention the claimed functionally recited pressure condition for its compressing step, it does employ the same mixing, compacting and sintering steps to obtain a product having the claimed density. The Specification, page 2, discloses an object of the invention to be able to obtain a powder metal part that has 99+% of

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[2] Claims 2-10 depended from independent claim 1. Our analysis will be limited to claim 1. We will also address the Appellants' arguments directed to specific claims.

[3] Appellants have not specifically challenged the Examiner's determination that it would have been obvious to a person of ordinary skill in the art to utilize lauric acid (described in Ozaki) as a lubricant in the process of Allroth.

theoretical density. The present record suggests that this objective is only achievable through the use of the described compaction process. The process of Allroth achieves the stated object of the present invention. Allroth (FF 10) discloses the mixture is compacting utilizing computer controlled HVC [high velocity compaction] to obtain a product having high density. Appellants have not argued or directed us to evidence that establishes the HVC process utilized by Allroth does not produce pressure sufficient to liquefy and uniformly distribute the lubricant within the compressed mixture with the lubricant effecting a uniform distribution of said liquid phase former on said particles of metal powder. The mere recitation of a property or characteristic not disclosed by the prior art does not necessarily confer patentability to a composition or a method. *Skoner,* 517 F.2d at 950. Where the prior art establishes a reasonable belief that the property or characteristic (pressure conditions) recited in the claims would have been inherent to the product or process, the burden of proof shifts to Appellants to show that this characteristic (pressure conditions) or property is not possessed by the prior art. *Compare Best*, 562 F.2d at 1255; *Spada*, 911 F.2d at 708. On this record, Appellants have not done so.

Appellants contend that Allroth discloses the graphite is utilized for mechanical properties and therefore is distinguished from being used as a lubricant. (App. Br. 5). Appellants' arguments are not persuasive. As set forth above (FF 9), Allroth discloses mixing particles of a metal powder with a lubricant and graphite to produce the same product. Moreover, Appellants acknowledge that Allroth discloses the use of graphite in admixture with the metal particles and lubricant. (App. Br. 5).

Appellants' arguments regarding the pressures specified in claims 5 and 7 are not persuasive for the reasons set forth above.

For the foregoing reasons and those stated in the Answer, we affirm the appealed rejection.

ORDER

The rejections of claims 1-10 under 35 U.S.C. § 103(a) is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED

PL Initial:
sld

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